Perform Multiaxial, Neuromuscular, Proprioceptive, and Agility Training

It is recommended that multiaxial (many plains of motion), neuromuscular (coordinated muscular movement), proprioceptive (body position sense), and agility (non-linear movement) exercises be included as a regular component of military PT programs. The work group found good evidence that injuries are reduced by increasing the proportion of PT time devoted to exercises that vary musculoskeletal stress in multiple plains and improve body coordination, position sense, and agility.

Background: Rehabilitation of soccer players with ankle sprains using a wobble board for balance, coordination, and proprioceptive training has been shown to be effective in preventing subsequent ankle sprains in an RCT. Evidence from research with handball players and soccer players suggests that this training may also prevent ankle sprains and anterior cruciate ligament injuries in healthy athletes. This and many other studies utilize exercises that are designed to improve awareness and control of knees and ankles during standing, running, cutting, jumping, and landing. Some programs consist of exercises and partner-perturbation with an inflatable ball, wobble board, and balance mat. A prospective cluster RCT demonstrated that some neuromuscular and proprioceptive activities specifically designed for a single sport (team handball) significantly reduced musculoskeletal injuries in youth aged 15 to 17. Risk for all injuries combined and also for lower limb injuries were significantly reduced in athletes, who performed the task-specific neuromuscular exercises over a 2-year follow-up, compared to age- and skill-matched control athletes. Research on exercises that develop core body stabilization, agility, and multiaxial movement skills has been performed in military populations without the balls, balance mats and wobble boards unlike the civilian studies mentioned. These programs are showing reductions of injury rates by 20 to 30 percent in basic trainees.

Aside from the neurophysiological learning that takes place to assist athletes and military Service members in moving their bodies in smoother, more coordinated fashion, the neuromuscular, multiaxial, proprioceptive, and agility conditioning in PT sessions reduces injury risk for other reasons—

1. Incorporating these activities into a finite training period reduces the trainees' excessive exposure to running activities, thereby reducing lower body injury risk.

2. The musculoskeletal stresses of training are more evenly distributed across the body (and in different axes of motion) by these types of drills, thereby reducing injury risk (unlike running, which focuses stress narrowly in the lower body).

3. Strength and stabilization exercises directed at the body core (trunk) represent many of the same movements required during more complex combat activities, and this may increase the likelihood of improved military occupational task performance and possibly reduce injuries.

   Recent effectiveness of a neuromuscular and proprioceptive training program in competitive female youth soccer players in decreasing anterior cruciate ligament injuries has been demonstrated over a 2-year period. The program, which consisted of a number of activities in addition to sport-specific agility drills (such as strengthening, stretching, education, and

plyometrics), resulted in a 74 percent reduction in anterior cruciate ligament tears. A 6-week, preseason neuromuscular training intervention program, done 3 times a week for one to 1 ½

hours reduced the rate of non-contact ACL injuries in females by 72 percent. The majority of these programs (and the intervention studies of them) that involve neuromuscular, multiaxial, and proprioceptive exercises are, by definition, multi-interventional. Many systematic reviews are supportive of this type of training for the reduction of musculoskeletal injuries.

**Information taken from Joint Services Physical Training Injury Prevention Work Group p. 28-77.

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